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### REMARKS

Reconsideration of the application as amended is requested.

The Office Action of July 7, 2006, indicated that claim 16 would be allowable if rewritten in independent form. Claim 16 was previously rewritten in independent form to include all the limitations of the base claim and any intervening claims, such that claim 16 is believed to be in condition for immediate allowance, and a notice to this effect is earnestly solicited.

In the Office Action dated July 7, 2006, claims 17 and 18 were objected to based upon an antecedent basis matter. Claim 17 has been amended to recite "foam insulation forming a roof substrate", such that the antecedent basis matter noted by the Examiner is now believed to be corrected.

Claims 1-3 and 17-18 were rejected under 35 U.S.C. § 102(b) as being anticipated by Graves U.S. Patent No. 4,141,187, and claims 4-15 and 19-20 were rejected under 35 U.S.C. § 103 as being unpatentable over Graves '187 in view of Van Wagoner U.S. Patent No. 4,719,723.

The Office Action states that Graves discloses "A moisture curing substantially nonvolatile polyether based adhesive *which may be disposed on the nap side which would inherently flow within the nap material.*" (Emphasis added.) As the Examiner is no doubt aware, "Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, *arranged as in the claim.*" *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 221 USPQ 481, 485 (Fed. Cir. 1984) (emphasis added). Furthermore, "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" MPEP 2112, citing *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (emphasis added) (citations omitted).

Claim 1 has been amended to clarify that the moisture curing adhesive is disposed on fleece material on a *lower side* of the waterproof membrane, and contacts an *upper surface* of a roof substrate. In contrast, Graves '187 discloses a water permeable outdoor carpet "sheet" having upwardly-facing nap. Specifically, at col. 4, line 64, through col. 5, line 2, Graves '187 states that "This sheet may be a woven backing material having an *upper layer* of a nap-like material which is also a synthetic polymer, or it may be a solid sheet of polymeric material. In the preferred embodiment, however, the upper sheet comprises a thin mat of *non-woven synthetic polymer carpet of the outdoor type*." (Emphasis added.)

It is the adhesive, not the sheet of carpet, that is waterproof in Graves '187. Specifically, at col. 5, lines 22-25, Graves '187 teaches that "the adhesive layer is applied to the chosen substrate in a fluid form, either by spraying, troweling, etc. *The liquid adhesive then polymerizes in situ to form the waterproof membrane*." (Emphasis added.) At col. 5, lines 54-59, Graves '187 states that "The adhesive materials employed in the instant invention may comprises any thermoplastic or thermosetting polymerizable materials. The most important characteristic of the polymeric adhesive material is that it be capable of providing a *water-impermeable polymeric layer upon curing*." (Emphasis added.)

Thus, Graves '187 actually discloses a water-permeable layer of outdoor carpet with a water-impermeable adhesive below the carpet. Significantly, the nap-like material of the carpet faces upwardly, and it would not therefore come into contact with the adhesive. Applicants can find no teaching or suggestion in Graves '187 to put the adhesive on the nap side of the carpet, and any suggestion that Graves '187 teaches such an arrangement is clearly contrary to the requirement that "the missing descriptive matter is necessarily present." MPEP 2112, *supra*. Furthermore, it is not at all clear that putting adhesive on the top (nap) side of the carpet of Graves '187 would provide a waterproof membrane or retain the carpet to the roof.

Graves '187 also does not teach that the outdoor carpet itself is waterproof, but rather teaches that the adhesive material "polymerizes in situ to form the waterproof membrane." (Col. 5, lines 24-25.) Thus, Graves '187 also does not disclose a waterproof membrane as recited in claim 1, and Graves '187 cannot anticipate claim 1 for this reason as well.

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Furthermore, Graves '187 clearly does not disclose or suggest "a moisture curing substantially non-volatile polyether based adhesive." Because the Office Action does not designate the particular adhesive of Graves '187 being relied on, Applicants respectfully assert that the Office Action is defective. Applicants request compliance with 37 CFR 1.104(c)(2) which states: "In rejecting claims for want of novelty or for obviousness, the examiner *must* cite the best references at his or her command. When a reference is complex or shows or describes inventions other than that claimed by the applicant, the particular part relied on *must* be designated as nearly as practicable. The pertinence of each reference, if not apparent, *must* be clearly explained and each rejected claim specified." (Emphasis added.) Applicants can only conclude that the Office Action relies on the adhesives disclosed in U.S. Patent Nos. 3,275,587 and 3,496,119, and discussed at col. 6, lines 38-59 of Graves '187. The adhesives of the '587 and '119 patents comprise an epoxy resin, amine hardener, and water. With reference to the attached definitions from *Hawley's Condensed Chemical Dictionary*, Eleventh Edition, a polyether is "a polymer in which the repeating unit contains a C=O bond," whereas an epoxide, which "characterizes the epoxy resins," is "an organic compound containing a reactive group resulting from the union of an oxygen atom with two other atoms." Clearly, an epoxy resin is not a "polyether based adhesive" as recited in claim 1, and Graves '187 cannot possibly anticipate claim 1 for this reason alone. Applicants again reiterate that anticipation by inherency requires that "the missing descriptive matter is necessarily present" in the reference. MPEP 2112, *supra*. (Emphasis added.)

Furthermore, given that Graves actually teaches a water *permeable* outdoor carpet with an *upwardly-facing* nap, with an epoxy adhesive that forms a waterproof membrane below the carpet, Graves '187 clearly does not teach or suggest the arrangement of amended claim 1. It is not at all clear that other adhesives could provide a waterproof adhesive membrane as taught by Graves '187. Substantial modification of Graves '187 would be required to provide the arrangement of claim 1, and the references themselves do not teach or suggest any such modification.

Claims 2-4 depend from claim 1, and are therefore believed to be allowable for those reasons set forth above in connection with claim 1.

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Independent claim 5 has been amended to clarify that a moisture curing polyether-based adhesive is disposed on a lower side of a waterproof membrane in contact with an upper surface of a substrate, with at least some of the adhesive disposed within fleece material on a lower side of the waterproof membrane. As discussed above in connection with claim 1, Graves '187 teaches an outdoor carpet layer having an upwardly-facing nap, and a waterproof layer of epoxy adhesive below the carpet. This arrangement is substantially different than the arrangement of claim 5, such that claim 5 is not believed to be anticipated or obvious in view of Graves taken either by itself or in combination with Van Wagoner or any of the other cited references.

Claims 6 and 7 depend from claim 5, and are therefore believed to be allowable for those reasons set forth above in connection with claim 5.

Independent claim 8 has been amended to clarify that the roof substrate has an upper surface, the waterproof flexible membrane has a lower surface, and moisture curing adhesive is in contact with the upper surface of the roof substrate and the lower surface of the flexible membrane. As discussed above, Graves '187 teaches outdoor carpet that is water permeable, with a waterproof membrane formed by the adhesive.

Applicants again note that inherency requires that "the missing descriptive matter is necessarily present." MPEP 2112, *supra*. Clearly, Graves '187 does not meet this requirement with respect to claim 8.

Claims 9-15 depend from claim 8, and are therefore believed to be allowable for those reasons set forth above in connection with independent claim 8.

Furthermore, claim 14 recites that the adhesive has a viscosity of about 200,000 to 300,000 centipoise. As discussed at [0015] of the present application, this viscosity permits extrusion, "yet provides high profile beads" that provide improved contact. In contrast, Graves '187 teaches that "the adhesive layer is applied to the substrate in a fluid form." (Emphasis added.) It is not at all clear that an adhesive having a high viscosity as recited in claim 14 could form a waterproof adhesive membrane as taught by Graves '187.

Independent claim 17 recites moisture curing adhesive disposed between a roof substrate and a flexible membrane. As discussed above, Graves '187 does not teach a moisture

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curing adhesive adhering a waterproof membrane to a roof substrate. Rather, Graves '187 teaches that the adhesive forms a waterproof membrane. The outdoor carpet of Graves '187 is clearly not a waterproof membrane. Accordingly, Graves '187 is not believed to anticipate independent claim 17.

Claims 18-20 depend from independent claim 17, and are therefore believed to be allowable for those reasons set forth above in connection with claim 17.

Applicants have made a concerted effort to make the present application in condition for allowance. In the event there are any remaining informalities, the courtesy of a telephone call to the undersigned attorney would be appreciated.

Respectfully submitted,

11/7/06  
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Date

  
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Jeffrey S. Kapteyn  
Registration No. 41 883  
Price, Heneveld, Cooper, DeWitt & Litton, LLP  
695 Kenmoor, S.E.  
Post Office Box 2567  
Grand Rapids, Michigan 49501  
(616) 949-9610

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*Hawley's  
Condensed Chemical  
Dictionary*

*ELEVENTH EDITION*

*Revised by*

N. Irving Sax  
and  
Richard J. Lewis, Sr.



VAN NOSTRAND REINHOLD  
New York

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### POLYDIMETHYLSILOXANE

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gins to degrade at 148C, retains strength and elastomeric properties in contact with synthetic lubricants, solvents, hydraulic fluids, oils, etc. at temperatures in the range 148–204C, has limited flexibility at temperatures below -17C. Non-flammable.

Use: O-rings, seals, gaskets, diaphragms, hose, sheets and coatings for fabrics and other surfaces.

**polydimethylsiloxane. (PDMS).** A silicone polymer developed for use as a dielectric coolant and in solar energy installations. It also may have a number of other uses. It is stated to be highly resistant to oxidation and to biodegradation by microorganisms. It is degradable when exposed to a soil environment by chemical reaction with clays and water, by which it is decomposed to silicic acid, carbon dioxide, and water.

**poly-p-dinitrosobenzene.** See "Polyac."

**"Polydril,"**<sup>233</sup> TM for a synthetic water-soluble polymer.

Use: Flocculating agent in the oil industry.

**polyelectrolyte.** A high polymer substance, either natural (protein, gum arabic) or synthetic (polyethyleneimine, polyacrylic acid salts) containing ionic constituents; may be either cationic or anionic. The former type is widely used for industrial applications. Water solutions of both types are electrically conducting, some are effective in concentrations as low as 1 ppm. In a given polyelectrolyte, ions of one sign are attached to the polymer chain, while those of opposite sign are free to diffuse into the solution. Major uses are flocculation of solids (especially dissolved phosphates) in potable water, dispersion of clays in oil well drilling muds, soil conditioning, anti-static agents, and treatment of paper-mill waste water. Ion-exchange resins are cross-linked (stabilized) polyelectrolytes.

See also flocculant; "Purifloc"; "Cat-Floc."

**polyene.** Any unsaturated aliphatic or alicyclic compound containing more than four carbon atoms in the chain and having at least two double bonds. Examples are pentadiene, cyclooctatriene.

**polyester fiber.** Generic name for a manufactured fiber (either as staple or continuous filament) in which the fiber-forming substance is any long chain synthetic polymer composed of at least 85% by weight of an ester of a dihydric alcohol and terephthalic acid (Federal Trade Commission).

See "Dacron"; polyethylene terephthalate.

Properties: Strength (staple) 2.2–4.0 g per denier; (continuous filament) up to 9.5 g denier, mp 264C, water absorption 0.5%. Nonflammable.

Use: Tire fabric, seat belts, reinforcement of rubber hose for sea water cooling systems, as blend in clothing fabrics, fire-hose jackets.

**polyester film.** Continuously extruded polyester sheet of various thicknesses, especially useful in electrical equipment because of its high resistivity. Its tensile strength of 25,000 psi is much greater than that of other plastic films. Sensitized polyester film is used in magnetic tapes, in the photocopying technique known as reprography.

**polyester resin.** Any of a group of synthetic resins, which are polycondensation products of dicarboxylic acids with dihydroxy alcohols. They are thus a special type of alkyd resin but, unlike other types, are not usually modified with fatty acids or drying oils. The outstanding characteristics of these resins is their ability, when catalyzed, to cure or harden at room temperature under little or no pressure. Most polyesters now produced contain ethylenic unsaturation, generally introduced by unsaturated acids. The unsaturated polyesters are usually crosslinked through their double bonds with a compatible monomer, also containing ethylenic unsaturation, and thus become thermosetting. Flame resistance is imparted by using either acid or glycol ingredients having a high content of halogens, e.g., HET acid.

The principal unsaturated acids used are maleic and fumaric. Saturated acids, usually phthalic and adipic, may also be included. The function of these acids is to reduce the amount of unsaturation in the final resin, making it tougher and more flexible. The acid anhydrides are often used if available and applicable. The dihydroxy alcohols most generally used are ethylene, propylene, diethylene, and dipropylene glycols. Styrene and diallyl phthalate are the most common crosslinking agents. Polyesters are resistant to corrosive, chemicals, solvents, etc.

Forms: Sheets, powder, chips.

Use: Reinforced plastics, automotive parts, boat hulls, foams, encapsulation of electrical equipment, protective coatings, ducts, flues and other structural applications, low-pressure laminates, magnetic tapes, piping, bottles, nonwoven disposable filters, low-temperature mortars.

See also alkyd resin, polyester fiber.

**polyethenoid.** Characterizing an aliphatic compound having more than one ethene group  $\text{—CH=CH—}$ . Linoleic acid is a polyethenoid fatty acid.

**polyether.** A polymer in which the repeating unit contains a  $\text{C=O}$  bond derived from aldehydes or epoxides or similar materials.

See also following entries.

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**polyether, chlorinated.** A highly crystalline material that is 46% chlorine. Outstanding corrosion-resistance. Good electrical resistance. Readily processed and fabricated.

Use: Fluid-bed coating, tank linings, piping, valves, laboratory equipment, chemical processing equipment.

**polyether, cyclic.** See crown ether.

**polyether foam.** A polyurethane foam, either rigid or flexible, made by use of a polyether as distinct from a polyester or other resin component.

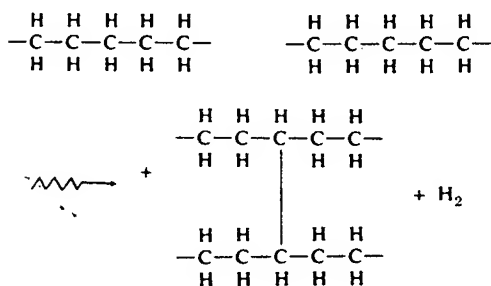
Hazard: As for polyurethane.

**polyether glycol.** A compound with a structural skeleton such as  $\text{HO}-\text{C}-\text{C}-\text{O}-\text{C}-\text{C}-\text{O}-\text{C}-\text{C}-\text{O}-\text{H}$ . The length of the chain can vary widely and the number of consecutive carbon atoms may be greater than two. Examples are polyethylene glycol and polypropylene glycol.

**polyethylene.** CAS: 9002-88-4.  $(\text{H}_2\text{C}=\text{CH}_2)_x$  chlorosulfonated. See "Hypalon." crosslinked (XLPE).

Properties: Thermosetting white solid, high-temperature-resistant, excellent resistance to chemicals and to creep, high impact and tensile strength, high electrical resistivity, insoluble in organic solvents, does not stress-crack. Combustible.

Derivation: (a) By irradiating linear polyethylene with electron beam or gamma radiation, crosslinking taking place through a primary valence bond, as shown.



(b) By chemical crosslinking agent such as an organic peroxide (e.g., benzoyl peroxide). All grades of polyethylene and most copolymers can be chemically crosslinked.

Use: Wire and cable coatings and insulation (low-density grades), pipe and molded fittings (high-density grades). Special types having low electrical resistivity can be made; these can be regarded as semiconductors.

Note: In molding crosslinked polyethylene, the desired part must be formed before crosslinking

is initiated, as material will not change its shape after crosslinking. The variations in composition and wide range of properties approach the ideal of a universal material more closely than most polymers.

#### Density

The density of polyethylene and other thermoplastic polymers is affected by the shape and spacing of the molecular chains; low-density materials have highly branched and widely spaced chains, whereas high-density materials have comparatively straight and closely aligned chains. Polymers of the latter type are called linear. The physical properties are markedly affected by increasing density.

#### low-density (branched chain)

Properties: Crystallinity 50–60%, d 0.915, mp 240F, tensile strength 1500 psi, impact strength above 10 ft-lb/inch/notch, thermal expansion  $17 \times 10^{-5}$  inch/inch/C, soluble in organic solvents above 200F, insoluble at room temperature.

Derivation: (1) Ethylene is polymerized in a free-radical-initiated liquid phase reaction at 1500 atmospheres (22,000 psi) and 375F with oxygen as catalyst (usually from peroxides). (2) A much more effective and cheaper process uses pressures of only 100–300 psi at less than 212F; the catalyst is undisclosed and reaction is vapor-phase.

Use: Packaging film, especially for food products, paper coating, liners for drums and other shipping containers, wire and cable coating, toys, cordage, refuse and waste bags, chewing-gum base, squeeze bottles, electrical insulation.

#### high-density (linear)

Properties: Crystallinity 90%, d 0.95, mp 275F, tensile strength 4000 psi, impact strength 8 ft-lb/in notch, high electrical resistivity, film is gas-permeable, hydrophobic, does not resist nitric acid.

Derivation: Ethylene polymerized by Ziegler catalysts at 1–100 atmospheres (15–1500 psi) at from room temperature to 200F. Catalyst is a metal alkyl, e.g., triethylaluminum plus a metallic salt ( $\text{TiCl}_4$ ) dissolved in a hydrocarbon solvent. A vapor-phase modification of this process was developed in 1965. Another method uses such metallic catalysts as  $\text{Cr}_2\text{O}_3$  at 100–500 psi with solvents such as cyclohexane or xylene.

Use: Blow-molded products, injection-molded items, film and sheet, piping, fibers, gasoline and oil containers.

Note: Ethylene may be copolymerized with varying percentages of other materials, e.g., 2-butene or acrylic acid; a crystalline product results from copolymerization of ethylene and propylene. When butadiene is added to the copolymer blend, a vulcanizable elastomer is obtained.

#### low molecular weight

Properties: Molecular weight 2000–5000. Translucent white solids, excellent electrical resistance,



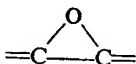
"Epolene."<sup>256</sup> TM for a series of low molecular weight polyethylene resins. Available in both emulsifiable and nonemulsifiable types.

"Eponol" Resins. TM for high molecular weight linear copolymers of bisphenol A and epichlorohydrin; produce outstanding surface coatings by solvent evaporation alone.

"Epon" Resins.<sup>125</sup> TM for a series of condensation products of epichlorohydrin and bisphenol-A having excellent adhesion, strength, chemical resistance, and electrical properties when formulated into protective coatings, adhesives, and structural plastics.

"Epotuf."<sup>336</sup> TM for epoxy resins, epoxy hardeners, and epoxy esters used as coating vehicles.

x { epoxide. An organic compound containing a reactive group resulting from the union of an oxygen atom with two other atoms (usually carbon) that are joined in some other way as indicated:



x { This group, commonly called "epoxy," characterizes the epoxy resins. Epichlorohydrin and ethylene oxide are well-known epoxides. The compounds are also being used in certain types of cellulose derivatives and fluorocarbons.

"Epoxols."<sup>152</sup> TM for epoxidized oils and esters. 7-4 High purity epoxidized soybean oil with a minimum of 7% oxirane oxygen. 9-5 A high oxirane (9% minimum) epoxidized triglyceride. 5-2E An epoxidized, higher alkyl ester. 7-4 and 9-5 are approved for use in food packaging materials.

Use: Vinyl films, sheetings, extrusions and coatings, polyvinylidene chloride, chlorinated rubber, chlorinated paraffins, nitrocellulose, and other compounds.

"Epoxybond."<sup>41</sup> TM for an epoxy adhesive putty in stick form.

1,2-epoxybutane. See 1,2-butylene oxide.

3,4-epoxycyclohexane carbonitrile.

O(C<sub>6</sub>H<sub>9</sub>)CN.

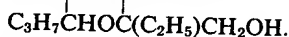
Properties: Liquid, d 1.0929 (20/20C), bp 244.5C, fp -33C, soluble in water.

Hazard: Toxic by skin absorption, ingestion, and inhalation.

Use: Intermediate, stabilizer.

epoxyethane. See ethylene oxide.

2,3-epoxy-2-ethylhexanol.



Properties: Liquid, d 0.9517 (20/20C), bp decomposes, fp -65C, slightly soluble in water. Combustible.

Hazard: Skin irritant.

Use: Stabilizer, intermediate.

epoxy novolak. Epoxy resin made by the reaction of epichlorohydrin with a novolak resin (phenol-formaldehyde; see novolak). These have a repeating epoxide structure which offers better resistance to high temperatures than epichlorohydrin-bisphenol A type, and are especially useful as adhesives.

2,3-epoxy-1-propanol. See glycidol.

epoxy resin. A thermosetting resin based on the reactivity of the epoxide group. One type is made from epichlorohydrin and bisphenol A. Aliphatic polyols such as glycerol may be used instead of the aromatic bisphenol A. Molecules of this type have glycidyl ether structures,

—OCH<sub>2</sub>CHOCH<sub>2</sub>, in the terminal positions, have many hydroxyl groups, and cure readily with amines.

Another type is made from polyolefins oxidized with peracetic acid. These have more epoxide groups, within the molecule as well as in terminal positions, and can be cured with anhydrides, but require high temperatures. Many modifications of both types are made commercially. Halogenated bisphenols can be used to add flame-retardant properties.

See also epoxy novolak.

The reactive epoxies form a tight crosslinked polymer network and are characterized by toughness, good adhesion, corrosive-chemical resistance, and good dielectric properties.

Most epoxy resins are the two-part type which harden when blended. A one-component liquid type for filament winding and a pelletized type for injection molding are available under the TM "Arnox."

Hazard: Strong skin irritant in uncured state.

Use: Surface coatings as on household appliances and gas storage vessels; adhesive for composites and for metals, glass, and ceramics; casting metal-forming tools and dies; encapsulation of electrical parts; filament-wound pipe and pressure vessels; floor surfacing and wall panels; neutron-shielding materials; cements and mortars; nonskid road surfacing; rigid foams; oil wells (to solidify sandy formations); matrix for stained glass windows; low-temperature mortars.